



Upcoming Meeting

Date: November 20, 2019

Time: 6:00pm to 8:00pm

Place: Olive Grove Restaurant

Topic: Opportunistic Pathogens 101

Speaker: William Rhoads, Viega

Meeting Format

6-6:30 Social

6:30-6:45 Announcements and Table Tops

6:45 Dinner Served

7:00-8:00 Speaker



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MEETING LOCATION



Olive Grove
Restaurant & Lounge

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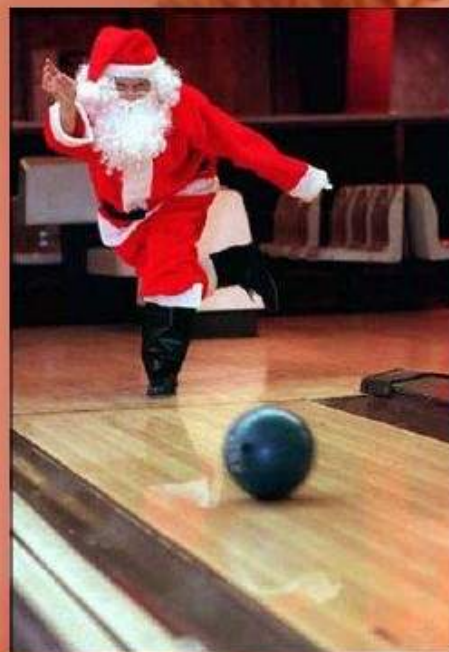
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**Jeffrey W. Edwards, CPD ,GPD
President**

President’s Report

Our October meeting had 35 attendees and they were presented with a great technical presentation from Mike Hainzl, from Generac, on natural gas pipe sizing for gas-fired emergency generators. I want to thank Mike for another great presentation to our chapter.

Myself, Chuck Swope, Chris Imhof and Brian Crisp, all board members with our chapter, attended ASPE’s Technical Symposium in Pittsburgh, during October 24th thru October 27th. I am proud to say that the Baltimore ASPE Chapter was awarded with ASPE’s Chapter Award of Merit for outstanding accomplishment in all areas of society and chapter activity, during the 2018-2019 year. Our chapter also earned awards for education, membership retention and research funding to the ASPE society. I want to thank our entire chapters board members for their hard work that is being recognized by ASPE along with myself.

In a matter of weeks, the Thanksgiving Day holiday will be here and right around the corner will be the Christmas and New Year holidays. I want to wish everyone a happy and safe Thanksgiving now.

On Friday, December 13th, we will hold our annual Holiday Party event again at Mustang Alleys from 7-10 PM. There will be bowling, food and beverages available. There is no cost to attend but we do request a new un-wrapped toy or check that will be donated to the Marine Toys for Tots Foundation as we’ve done in the past. Please refer to our flier in our newsletter.

Please know if there is anything you want to discuss about our chapter, please feel free to reach out to me.

Best Regards,
Jeff Edwards, CPD, GPD
President-ASPE Baltimore Chapter

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We are very excited to announce that we are collaborating with our AYP members to interview members of our chapter for our new Member Spotlight Series! Each week, we will tell you about a different member of our Chapter to learn about their experience in the Plumbing Engineering field.

Follow us on LinkedIn to read about our first three integral members; Jeff Edwards, Chuck Swope and Kathy Dwyer.

We encourage our members to share their experiences with our chapter on social media with the hashtags:

- #ASPEBaltimore
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- #WOABaltimore

If you have a story or photo you would like to share on our Facebook or LinkedIn page, let us know. We are proud to support our chapter members!





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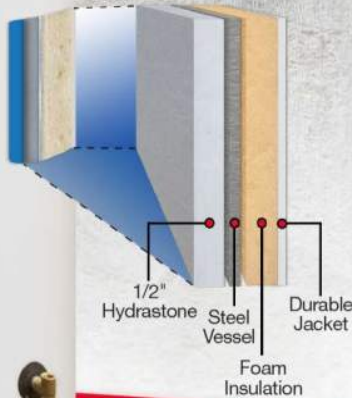
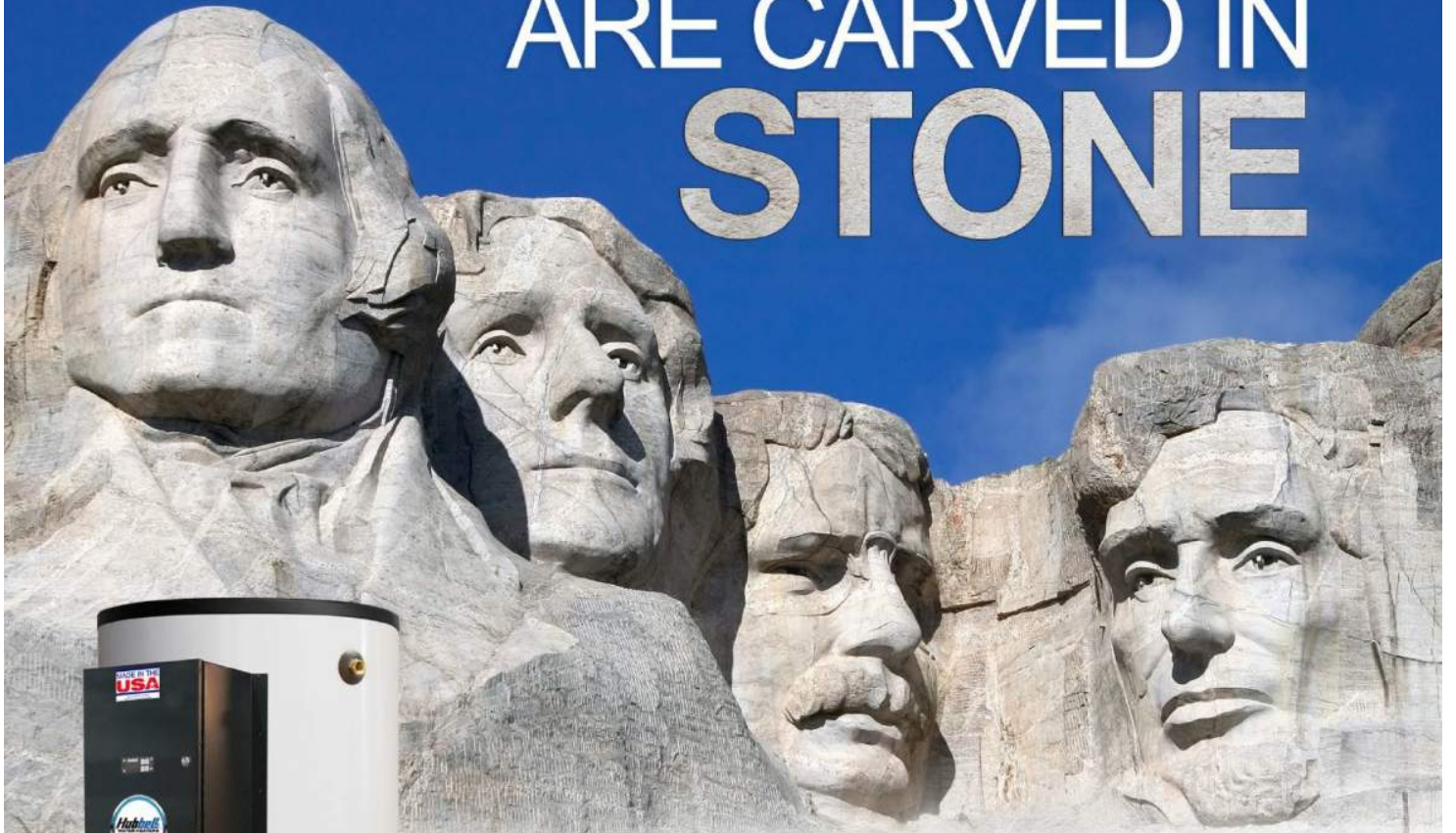
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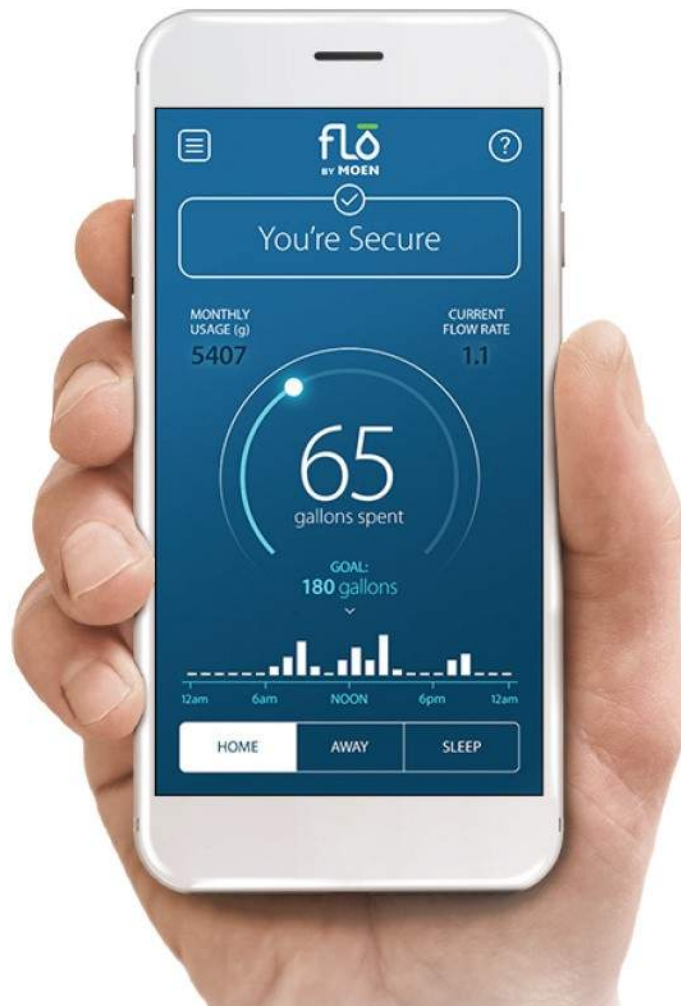
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Chuck Swope, PE, CPD, LEED AP BD+C
Vice President—Technical

Technical Report

First, we want to thank Mike Hainzl from Generac for another great presentation on Natural Gas Sizing for Generators. There are a variety of designs and opinions on gas trains supplied for Emergency Gas Generators, so we felt that it was best to get the information from the source. Mike's first presentation in 2018 on Natural Gas Reliability was a big hit, so we asked him back. He has been a great asset to our chapter, and I hope that we can invite him back in future seasons.

At the end of October, I attended my first ASPE Technical Symposium, which was held this year in Pittsburgh. Since I had such a positive experience at last year's ASPE Convention in Atlanta, I definitely had high hopes. While I was certainly not disappointed, it was an entirely different experience. The expo held on Thursday was a bit smaller, but there was still a lot to see. It was nice to follow up with some manufacturers that had brand new products last year to see how they are performing. On Friday, we had some free time to explore the city. Six miles later, I can say I that I only saw a small portion of what Pittsburgh had to offer! It is interesting to see how a city that was focused on heavy industry can transition so successfully. Friday and Saturday's tech sessions were eye-opening as well. I wanted to attend seminars where I could be exposed to new topics like Medical Oxygen Concentrators and Seismic Bracing, as well as familiar topics that I wanted to know more about like Roof Drain testing and Sprinkler System Selection. The presenters were fantastic, and they made themselves available after the session for even more questions! All in all, it was a great opportunity to learn and network with other engineers, reviewers, and code official from all over the country. Not a bad way of earning a few CEUs either!

This November, we bring the experts to you! Dr. William Rhoads will present on the topic of Opportunistic Pathogens, courtesy of Mike McCarthy from Viega. We all know that Legionella has been a hot topic for a while and as a chapter, we are making sure that our members and attendees are well informed. However, Legionella is not the only problem. Dr. Rhodes will teach us about why we need to be concerned, how the pathogens operate, and the most effective ways of dealing with each one.

Dr. William Rhoads is a postdoctoral researcher at Virginia Tech. His research explores applied environmental microbiology and chemistry in building drinking water systems. William earned his PhD in Civil and Environmental Engineering at Virginia Tech, where he was supported by the Charles E. Via Doctoral Fellowship, the AWWA Larson Aquatic Research Doctoral Scholarship, and the Alfred P. Sloan Foundation Microbiology of the Built Environment Program. His research has been recognized with honors, including the 2017 Outstanding Doctoral Student Award in the College of Engineering at Virginia Tech and the 2017 CH2M/AEESP Outstanding Doctoral Dissertation Award.

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CPD Review Class 2020

The Washington DC and Baltimore ASPE Chapters will be providing a joint Baltimore-Washington, DC ASPE Chapter CPD Review Session on Saturday, February 1, 2020 at the training center of E.J. Dwyer Co. in Annapolis Junction, MD. (Note: A bad weather make-up date will be scheduled for no later than Saturday, February 29th.) The session will be from 8:30 AM to 3:30 PM (or longer as needed) with a lunch break. Bagels, juice & coffee in the morning and lunch will be provided by the good people of E.J. Dwyer Co. Directions to the office in Annapolis Junction (north of Laurel) may be found on their company website at www.ejdwyer.com under Contact Us or by clicking google maps link: <https://goo.gl/maps/4nEvRNG6kEK2>

Any ASPE member interested in attending this session is required to forward an e-mail to either Kathy Dwyer or Ned Dwyer at the following respective addresses: kdwyer@ejdwyer.com and ndwyer@ejdwyer.com

Please take notice of the following:

- Registration for the CPD Exam (through ASPE) opens December 1, 2019 and closes March 19, 2020. Link to website: <https://aspe.org/CPDExam>
- Note the reference to any ASPE member, since it is generally more economical for one registering to take the CPD exam to be an ASPE member prior to registering for the exam. Please contact a local ASPE Chapter VP Membership ASAP to become a current member;
- ASPE members not classified as Full shall be subject an exam eligibility evaluation by Society that may take as many as five business days. (You may wish to take the initiative and visit the ASPE web-site and preview the requirements for Full membership to see if you would qualify); and
- The ASPE CPD Exam is scheduled to take place March 30 thru April 5, 2020.

Attendees to our review class are expected to bring to the review session at a minimum a calculator, writing materials, a copy of the CPD Review Manual and a hard copy of all attachments that may accompany any future e-mail follow-up responses. NOTE: CPD Review Manuals will be available for purchase before and following the CPD Review Session.

I look forward in seeing you at the review class.

Sincerely,

David Bailey

David M. Bailey, CPD, GPD, FASPE

DATE: February 1, 2020 from 8:30 AM to 3:30 PM
LOCATION: E.J. Dwyer Co. 10910 Pump House Road, Annapolis Junction, MD 20701
CONTACT: Kathy Dwyer – kdwyer@ejdwyer.com – Mobile: 443-250-0285
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Christopher Imhof, PE, CPD
Education Committee Chair

ASPE Symposium 2019 - Lessons in Legionella

By Chris Imhof PE, CPD

If there was one theme that stood out at this year's ASPE symposium, it was Legionella. Of the variety of technical sessions offered, the technical sessions that drew the largest crowds and the most discussion were on Legionella and its association with hot water and water quality. The line-up of speakers was impressive with representatives of the internationally known Special Pathogens Laboratory, ASPE International, the Veterans Affairs Hospital system, various water quality consultants, and a past Society President and ASPE Fellow.

Janet E. Stout, PhD and Frank Sidari PE, BCEE kicked off the Symposium with their presentation "Ending Legionnaires' Disease: An Audacious or Achievable Goal?". Dr. Stout is president and director of Special Pathogens Laboratory (SPL), and research associate professor at the University of Pittsburgh Swanson School of Engineering. She is credited as being the first to demonstrate the link between Legionnaires' disease and the presence of Legionella in hospital water systems. Her seminal discovery in 1982, shifted the focus from cooling towers to water distributions systems as the primary source for Legionnaires' disease. This changed the direction of research and expanded the water treatment industry's approach to controlling Legionella. She serves on Legionella standards and guidelines committees for both ASHRAE and CTI. Mr. Sidari is Technical Director for SPL Consulting Services and oversees SPL's multidisciplinary team in providing Legionella services including, water safety programs, facility audits, outbreak response, disinfection assistance, and engineering support. He conducted the first U.S. field evaluation of chlorine dioxide disinfection to control Legionella in a hospital campus water system. The SPL's mission is to end Legionnaires' Disease. They believe no one should die from a preventable disease caused by bacteria in water, and that the disease can and should be prevented. Dr. Stout's portion of presentation emphasized the link between Legionnaires' Disease and Construction, pointing out several outbreaks with multiple deaths each at medical buildings. Construction can impact water quality due to excavation, water main breaks, pressure changes, disruption of biofilm, construction materials, dormant periods prior to occupancy, and ineffective disinfection/commissioning. Mr. Sidari highlighted issues with disinfection and commissioning. Complying with minimum building codes for flushing and disinfection does not address Legionella. Legionella is more resistant to chlorine than other bacteria such as coliform bacteria and HPC. If a system that is sampled and tests negative for Coliform and HPC, then it may still test positive for Legionella. Microbiological sampling specifications should include testing for what, when, where, and how samples are taken. The SPL believes Legionnaires' Disease is an achievable goal provided the following:

- The conditions for favorable growth are understood and those conditions are controlled/limited by design construction, commissioning and water management, and
- Building water systems are proactively tested for Legionella, and systems that test positive for Legionella are actively treated.

Conrad Jahrling, Staff Engineering Supervisor at ASSE International, presented on thermostatic mixing valves, point-of-use valves, and water heaters used as temperature controllers. Mr. Jahrling introduced the audience to new ASSE standards 1082, 1084, and 1085. These standards will allow water heaters certified to the new standards to act as code compliant means to control outlet temperature without additional mixing valves. The ability to control hot water temperatures has an affect on the problem associated with scalding vs. Legionella prevention. The 2021 editions of the Uniform Plumbing Code and International Plumbing code are expected to include these new ASSE standards.

Matt Freije, the founder and CEO of hcinform.com, explained how metrics can be used to reduce the risk of Legionella in domestic water systems. hcinform.com is the provider of LAMPS, a cloud-based application for water management plans (WMPs), data analytics, and training. Mr. Freije presented a series of statistics generated from his experience and program. Mixed hot-cold water is much more likely to test positive for Legionella compared to just cold water or hot water. Flushing systems may reduce the concentrations of Legionella, but this has little effect on the percentage of positive tests for Legionella. Sample building data has shown that the average cold-water temperature per month fluctuating between 44°F and 76°F. These temperatures could be compared to samples showing levels of free chlorine, total chlorine in system, and how levels are influenced by cold water supply temperatures.

Kevin E. Merritt presented on the Legionella outbreak that occurred at the Veterans Affairs Hospital in Pittsburgh during 2011 and 2012. Mr. Merritt is the Supervisory Environmental Engineer at the Department of Veterans Affairs - Pittsburgh Healthcare System. The hospital opened in 1954 and was followed by numerous additions and extensive remodeling. Cases were common in the 1970's until Special Pathogens Laboratory and Facilities Management implemented surveillance and disinfection. Special Pathogens Laboratory was closed in 2007 resulting in loss of expertise. A small plumbing staff prior to the outbreak made maintenance of disinfection system difficult. The complex plumbing system, especially with all of the previous modifications (main building has three hot water loops alone) made the system at higher risk for outbreak. The outbreak involved 22 veterans contracting Legionnaires' disease resulting in 6 fatalities. The reaction to outbreak was a combination of short- and long-term solutions. First, facilities management remediated problems in response to positivity, implemented water quality monitoring, and secondary disinfection. Second, a water safety committee and water management plan were created. Patients presenting symptoms of pneumonia were tested and additional environmental sampling was conducted. Chlorinators were installed, as well as mixing valves installed at all sinks and showers. Later, a comprehensive monitoring system was installed with stations equipped to monitor pH, temperature, chlorine, flow, pressure, ORP, and conductivity. Finally, an environmental engineer was hired to oversee water safety program.

Chris Ebener, the director of Engineering for LiquiTech, provided statistics from field investigations of water quality issues. LiquiTech is a leading manufacturer and provider of copper silver ionization. Their goal is to provide a multi-barrier approach that mitigates risks, increases confidence, and provides the safest, cleanest, most dependable water systems to ensure that people and organizations are protected. Statistics provided by Mr. Ebener are as follows:

- 50% of Engineering Field Evaluations for low disinfectant levels found softeners between treatment and the point of use;
- 30% of Engineering Field Evaluations for consistent Legionella positivity found malfunctioning PRV's upstream of affected locations;
- 45% of Engineering Field Evaluations for consistent Legionella positivity found significant deviations in cold water temperatures at point of use; and
- 95% of Engineering Field Evaluations for consistent Legionella positivity quantified significant, periodic or continuous, sediment and particulate intrusion.

Joe Scott II, CPD, LEED AP, FASPE presented on the topic of Hot Water Systems Design for Code Compliance. Mr. Scott is a Senior Vice President at CannonDesign, an ASPE Fellow, a former Society President of ASPE, and a regular speaker at ASPE expos and symposiums. The focus of Mr. Scott's presentation was codes and standards for hot water and his evolving thoughts on design temperatures.

There are numerous codes and standards for hot water, bASHRAE 188, ASHRAE Guideline 12;

- OSHA Technical Manual Section III Chapter 7 Legionnaires' Disease;
- CDC – Guidelines for environmental infection control in health-care facilities;
- FGI Guidelines for Hospitals and Outpatient Facilities;
- International Plumbing Code;
- International Energy Conservation Code; and
- ASHRAE 90.1.

“Management of Legionella in Water Systems (2019)” is a new paper by the National Academies of Science, Engineering, and Medicine. This new study promotes ideas beyond those of previous codes and standards, and are listed as follows;

- Hot water generation temperatures above 140°F with temperature to distal point should exceed 131°F;
- Low-flow fixtures should not be allowed in hospitals and long-term care facilities;
- Sustainable design has exacerbated many of the problems in premise plumbing systems;
- Require water management plans in all public buildings; and
- Flushing of water can have significant benefits in terms of water quality and more specifically Legionella levels.

Mr. Scott said he is giving serious consideration to changing his thoughts on design standards for healthcare projects to generate hot water at 158°F, distribute at 138°F, and return hot water to TMV and water heater at 132°F. To prevent scalding with these elevated temperatures, correctly sized, and installed TMVs would be required.

The following could be concluded after attending the 2019 ASPE Technical Symposium:

- Legionella is not going away anytime soon with increased awareness along with testing of systems and patients in resulting in more documented cases of Legionella and Legionaries disease;
- Standards such as ASHRAE 188 and OSHA that provide guidelines to reduce risks of Legionella;
- There are an overwhelming number of issues that can increase risk of Legionella (i.e. dead ends, stagnation, disinfection and flushing, construction, system age, system temperatures, chlorination levels, system management, low flow fixtures, material selection, corrosion, patient health, etc.);
- Typical flushing and disinfection procedures do not specifically address Legionella;
- Systems are often flushed and disinfected months before use;
- Chlorine levels in a system can be diminished due to a range of factors;
- Construction is a significant concern for Legionella;
- Existing plumbing systems are getting older and will result in a higher risk of Legionella and more reported cases;
- Hot water temperatures are up for discussion, the scale is tipping towards hot water and Legionella control and away from scalding risk; and
- Healthcare facilities remain the largest area of concern for Legionella.

This is certainly one of the best Society events that I've attended and will continue to use the lessons learned for years to come.



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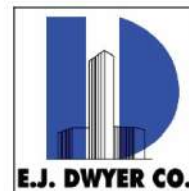


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Kathy Dwyer
Treasurer

Treasurer’s Report

I want to tell all of you I appreciate your diligence in using the website to register for the monthly meetings. It makes the job of greeter so much easier. So thank you and yes I have noticed!

I am happy to report our chapter is in solid financial position. We have had many supportive companies step up and advertise which is much appreciated. I hope you will support those who support ASPE.

Please remember to stop by our tabletops! The raffles are all possible because of the price of tabletop. If the engineers who attend would like another raffle ticket for the engineer only raffle the tabletop folks will be happy to give you a ticket if you stop by their display.

Please let myself or any of the board members know if we can assist you in anyway. I am always to hear your favorite foods and preferences as well.

I look forward to seeing all of you in a couple of weeks.

Kathy Dwyer
kdwyer@ejdwyer.com

Kathleen Dwyer
kdwyer@ejdwyer.com

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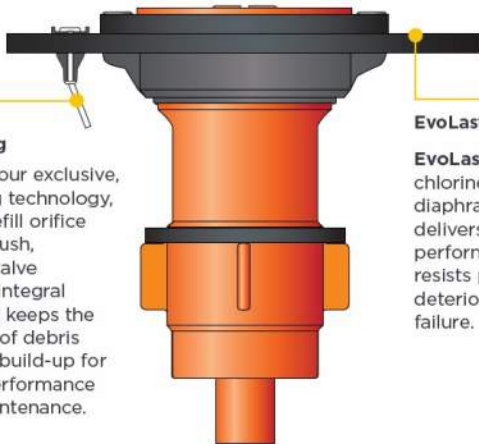
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J. Richard Wagner, PE
Vice President - Legislative

Maryland State Plumbing Code

The Maryland State Plumbing Code is in the process of switching to the 2018 International Plumbing Code (IPC). This will coordinate the State Plumbing Code with two-thirds of the Maryland state population which is under the IPC for plumbing. The 2018 International Fuel Gas Code (IFGC), the 2017 NFPA 58 Liquefied Petroleum Gas Code, and the plumbing chapters of the 2018 International Residential Code (IRC) are also being adopted. A Notice of the Proposed Action is in the Maryland Register dated October 11, 2018 under Title 09 – Maryland Department of Labor – 09.20.01. Comments are being accepted by Robin Bailey at the Department of Labor through November 12, 2019. A public hearing will be scheduled after the Comments are received and reviewed.

J. Richard Wagner, PE
ASPE Baltimore V.P. Legislative



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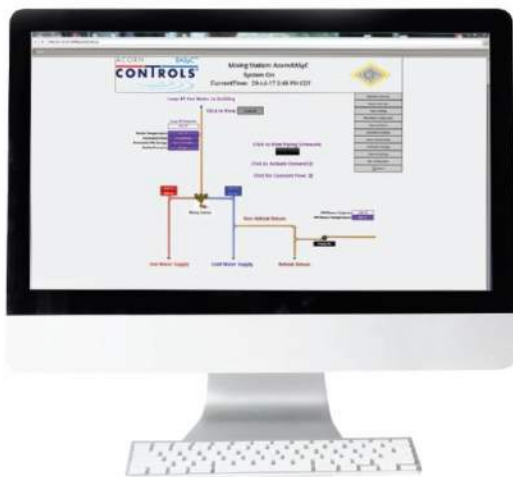
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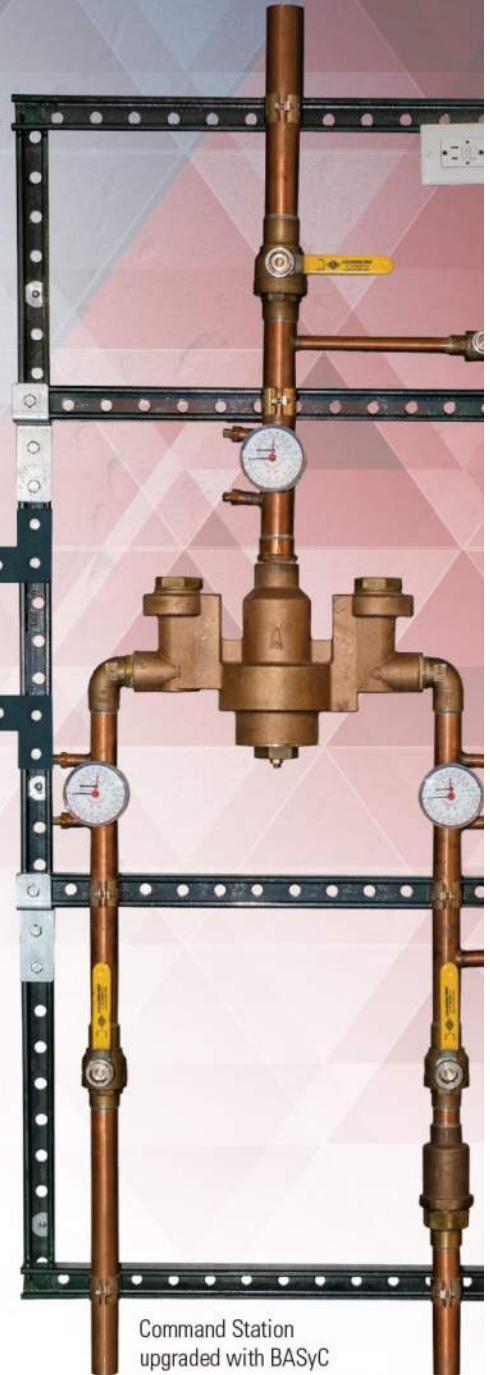
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Legionella Control for Building Water Systems

Eliminating Legionella growth conditions with proper system design, installation and maintenance.

September 3, 2019

[Ron George](#)



Legionnaires' disease is a serious form of pneumonia caused by Legionella bacteria that grows in a building water system and becomes aerosolized. When the bacteria is aerosolized and inhaled, it gets into the lungs where it can grow and cause an infection and pneumonia or fluid in the lungs known as Legionellosis or Legionnaires' disease. People with a suppressed immune system have an increased susceptibility.

When Legionella grows to high numbers it can be spread to susceptible hosts when it is aerosolized. In many applications aerosolization of water cannot be avoided, such as in showers, cooling towers and fountains. Instead of trying to prevent aerosolization, the focus should be on preventing bacteria growth in the building water system using physical or chemical control methods.

Even with chemical or physical controls, Legionella can grow in dead legs or seldom used parts of building water systems that are warm, wet, and where there are nutrients that are a food source for the bacteria. The key is to eliminate growth conditions and minimize or eliminate dead legs and seldom used branches. This can be accomplished with proper system design, installation and maintenance.

Centers for Medicare and Medicaid Services (CMS) Requirements

On June 9, 2017, the "Director of the Centers for Medicare and Medicaid Services' Committee on Quality, Safety and Oversight," issued a memorandum to State Hospital Survey Agency Directors requiring that all inspectors that inspect facilities that receive Federal reimbursement money for Medicare & Medicaid patients comply with a new directive. The Agency director, David R. Wright, has since issued a revision to that

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memo on July 6, 2018 to State survey agency directors to further clarify the requirements for facilities to have water management programs that comply with ASHRAE Standard 188.

I serve on the ASHRAE Standard 188 committee. The memo addresses the CDC statistics about the drastic rise in reported cases of Legionnaires disease since 2000. I applaud CMS for issuing their memo because it was the first nationwide document requiring hospitals and nursing homes to have water management plans to reduce Legionella risk in healthcare facility water systems to prevent cases and outbreaks of Legionnaires' Disease. The City of New York and the State of New York now have requirements for buildings to register cooling towers which were determined to be the cause of a large outbreak in New York City in the Summer of 2015 and this has prompted a need to provide water management plans for building water systems in New York. Other cities, counties and local jurisdictions are considering adopting similar language, and there is a need for uniform legislative language that can be easily adopted so that enforcement is consistent across the country.

The Centers for Medicare & Medicaid (CMS) directive requires' Medicare and Medicare/Medicaid certified healthcare facilities to have water management policies and procedures to reduce the risk of growth and spread of Legionella and other opportunistic pathogens in building water systems.

Facilities must have water management plans and documentation that, at a minimum, ensure each facility: Conducts a facility risk assessment to identify where Legionella and other opportunistic waterborne pathogens could grow and spread in the facilities building water systems; Develops and implements a water management program that considers the ASHRAE industry standard and the CDC toolkit; Specifies testing protocols for verification and validation of acceptable ranges for control measures and how to document the results of testing and the corrective actions that must be taken when control limits are not maintained; and Maintains compliance with other applicable Federal, State and local requirements.

Long Term Care (LTC) facility surveyors will expect that a water management plan or program (which includes a facility risk assessment report and development of a system flow diagram by qualified individuals and testing protocols) is available for review but will not cite the facility based on the specific risk assessment or testing protocols in use.

The Centers for Medicare and Medicaid "Guidance" and "Process" for LTC surveyors will be communicated in an upcoming survey process computer software update to CMS LTC inspectors.

The Centers for Medicare & Medicaid (CMS) policy memorandum is available online at: <https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/QSO17-30-HospitalCAH-NH-REVISED-.pdf>

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Water Conservation Efforts

According to the CDC, during the period between 2000 and 2014, the rate of reported cases of legionellosis increased 286 percent in the U.S., with approximately 5,000 cases reported to the Centers for Disease Control and Prevention (CDC) in 2014. It is my opinion that more likely than not that this upward trend in reported cases is associated with Legionnaires' Disease and Pontiac fever (a milder, influenza-like illness in the Legionellosis family) is associated with water and energy conservation efforts over approximately the same time period. Many cases still go undetected or unreported and they are often misdiagnosed as simply pneumonia without testing for Legionnaires' disease. According to the CDC, approximately 9 percent of reported legionellosis cases are fatal.

In 1992 the Energy Policy Act (EPACT) was the first major water conservation legislation that had mandatory water use reductions for plumbing fixtures. Volunteer programs became popular after they published their energy and water conservation guidelines and many other water conservation programs followed and have become popular via local mandatory requirements or voluntary compliance for a points or award system that rewards building owners with a plaque for the level of compliance. These programs encourage further reductions of water use beyond the limits established in the EPACT and this started to occur around the time period in which the CDC started to document a significant increase in reported cases of Legionnaires disease. There are two EPA studies with the help of four universities under way that are researching the cause and effect relationship between water conservation programs and bacterial growth. Results of these studies should be published in the coming years.

Reductions in water use are contributing to slower water flows in public water mains, which will more likely than not, remain oversized to allow for fire flows. A recent calculation of water flows prior to 1992 and using today's ultra-low flow fixture flow rates shows over an 80 percent reduction in water use. That is good news for water conservation but bad news with respect to water age and chlorine residuals at fixtures. These water-use reduction efforts contribute to aging water and less water treatment chemical residual (Chlorine) at the ends of water mains. Today, it takes about five times longer for water from the treatment plant to reach the farthest customers in the same distribution system. In the past, (prior to 1992) it took 3 to 4 days for water from the treatment plant to reach the end of a large distribution system under normal flow velocities or usages. With today's flow rates, it would take about 15 to 20 days for water to reach the end of the same large distribution system.

Chlorine should last 3 to 4 days and have a measurable residual at the end of the system in 1992, however, chlorine dissipates over time as it reacts with contaminants, pipe materials, temperature, etc., and would not be expected to have a measurable residual that would control Legionella bacteria growth after 15 to 20 days in a water main. In the future, civil engineers may need to explore circulated grids or return water mains with duplex or self-cleaning in-line filter or flushing stations and/or treatment

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facilities or secondary water treatment stations in the distribution network in order to control bacterial growth throughout longer/larger water utility distribution systems.

ASHRAE 188 Standard

In June of 2015, an industry standard was published by American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE). The standard was titled, "ASHRAE 188-2015: Legionellosis: Risk Management for Building Water Systems." Within days of publication of the Standard, a Legionnaires disease outbreak was identified in New York City in the Summer of 2015, it was reported that about 130 people in New York City were infected with Legionnaires', the majority of them were in the Bronx, causing over a dozen people to die and others in New York became ill with Legionnaires disease, but were not in the Bronx. In that investigation, a cooling tower was implemented in the Bronx, but the others who lived in another area of the city more likely than not did not get it from that cooling tower.

There are other contributing factors to widespread distribution of Legionella bacteria. Legionella can get introduced into building water systems by a number of causes including but not limited to Water main breaks, fire events, changes in water chemistry, system shut-downs, air in the piping system, etc. Before the water with bacteria is aerosolized, it must first be introduced into the building water system and experience conditions where it can grow to numbers that are high, which would increase the efficiency of the transmission to humans when it is breathed in. This can happen in building water systems that are poorly designed or poorly maintained.

Aerosolization, Maintenance and Water Management Plans

There are several common sources of fixtures and equipment or building water systems that can aerosolize contaminated water and cause Legionnaires Disease. However, if the water is treated or maintained where it will not support bacteria growth, it will minimize or eliminate the chance of transmitting aerosolized bacteria to susceptible persons. Any system, if not maintained properly, can allow contaminated water to be breathed in by susceptible persons.

The common thing among most Legionella outbreaks is presence of Legionella bacteria in the utility water source, temperature and environmental conditions ideal for growth, aging water (dissipation of water treatment chemicals). In some cases, poor system design, installation and/or maintenance can significantly increase the chances of Legionella bacteria growing with a number of things that could fill up the pages of this magazine. In many cases, when there are cases of Legionella it can be attributed to there is poor maintenance or lack of maintenance of the building water systems. Each source of aerosolized water requires either regular flushing, control of temperatures, or the addition of secondary water treatment chemicals as part of routine maintenance in order to control the risk of Legionella bacteria growth in each system. This is where a water management plan is important for all buildings.

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A water management plan is the guiding document for a building water system maintenance schedule to help maintenance personnel perform routine maintenance on a schedule that maintains the building water systems in a clean and safe condition. Currently, the facilities mandated for water management plans are healthcare facilities under the CMS program and a few local jurisdictions, like New York, which have mandated registration of Cooling Towers. Local, State and national Government officials should consider mandating a water management program for all commercial buildings that serve the public.

The water management plans should at a minimum comply with ASHRAE 188, even if the model codes adopt 188 as a mandatory requirement local jurisdictions should require registration of building water systems which would include a validation test to assure the systems are being maintained. The healthcare industry used to be where the majority of outbreaks occurred, because they are large buildings with susceptible populations. Hotels, waterparks and other public buildings with decorative fountains are increasingly having outbreaks because they have no mandatory requirements to have water management plans. Local jurisdictions should consider registration of more than just cooling towers.

The ASHRAE 188 standard gives direction on what types of buildings should have water management plans or programs and it gives direction on how to set up a water management team in large or complex buildings where building water systems should be maintained and controlled to reduce the risk of Legionella bacteria growth. The complimentary ASHRAE Guideline 12 document gives further direction on how to control Legionella Bacteria in Building Water systems. ASHRAE is also working on a new standard titled, "ASHRAE 514," which will be a new standard for Prevention of Injury and Disease Associated with Building Water Systems.

The CDC toolkit

In 2016, the CDC and its partners developed a toolkit to facilitate implementation of the ASHRAE Standard. The CDC toolkit was a start, and it calls for water management team members with seven (7) different skill sets as part of the water management team. I have often found a lack of plumbing and mechanical expertise when looking at remediation efforts related to Legionella cases. I also see in many cases, where a water management team, risk assessment team, or remediation team does not have team members with plumbing, or mechanical system knowledge or skills.

It is important for persons assessing the risk of building water systems to have the skills, ability and knowledge of those systems. They should have the ability to properly draw an accurate system flow diagram showing all of the components and identify the potential risks in the building water systems. The example drawings in the CDC toolkit show process flow diagrams with blocks identifying subject areas and they are poor examples of how system flow diagrams should be drawn.

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I have seen inexperienced risk assessors that are required to develop a flow diagram of a building water system, copy the block diagrams from the CDC toolkit and paste them in their water management plan to serve as their system flow diagram. These copies in no way represent what is happening in a building's water piping system. Shortcomings in the CDC toolkit demonstrate a need for plumbing and mechanical design professionals to be consulted for updating the toolkit.

The CDC toolkit is available at: www.cdc.gov/legionella/maintenance/wmp-toolkit.html.

Epidemiology

Epidemiology is the study and analysis of the distribution, patterns and determinants of health and disease conditions in defined populations or areas. Epidemiology can also be applied to an analysis of plumbing systems to determine which piping or equipment conditions promote Legionella bacteria growth.

Epidemiology is the cornerstone of public health, and the outcomes determined from the epidemiology studies or documentation and analysis of the facts can help shape policy, code and standard decisions and by using evidence-based practices for identifying risk factors in building water systems for disease and targets for prevention. Epidemiology through investigations and lab experiments has taught us about what Legionella needs to survive and to grow with respect to temperature, pH and nutrients.

Dead Legs

Dead legs can grow bacteria because of ideal temperatures due to heat conduction into the walls of the branch pipes. High points in piping systems trap air and stagnant water gives off tiny bubbles of gas that can add to air pockets at high points in a seldom used pipe branch (dead leg). These air or gas pockets are compressed as the city water pressure acts on the air pockets and they expand as the water pressure drops during flow. When the air pockets expand, they cause water in a dead leg to surge back into the main dosing the main with Legionella bacteria from the dead leg. This pressure drop and subsequent dosing of the main with bacteria can happen many times a day during peak flow periods in the main. This is why dead legs should be kept to no more than about five pipe diameters.

Tests using clear piping with colored dyes showed water can swirl into a branch with eddy currents at a tee, up to about five times the pipe diameter. Any further than five pipe diameters and the water treatment chemicals may not flow into the branch well enough to control Legionella bacteria growth.

There are three manufacturers promoting piping systems that flow through branches or flush piping at the ends of seldom used branches. These designs are very popular in Europe where they do not allow water treatment chemicals in some countries and severely limit the levels in other countries causing a demand for flushing and elimination of dead legs or seldom used branches. The manufacturers are: Kemper, Viega and

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Georg Fischer. These systems have not been overly popular with healthcare design teams in the U.S. yet, because of the concerns over the additional cost for these systems. As awareness of the benefits of these systems increases and as owners realize preventing one case of legionella can save millions in litigation costs for a facility, these systems will soon increase in demand.

Eliminating dead legs will create the need to reroute piping for equipment bypasses and add shut-off valves with drain valves or flushing valves between the isolation valves for flushing seldom used branches before putting them back into service.

Environmental, clinical, and epidemiologic considerations for healthcare facilities are described in the CDC toolkit and it includes control measures such as physical controls like temperature management, chemical controls such as disinfectant levels, visual inspections for identifying risks, and how to conduct environmental testing for pathogens if environmental testing is done.

Testing for Legionella simply confirms you have a problem. Testing won't fix the problem, but it will confirm it is fixed when the corrective actions are taken. Corrective actions should not be a guessing game. They should be done by professionals that know what they are doing.

Tanks Do Not Cause Legionella Bacteria Growth

The CDC toolkit says many outbreaks are linked to environmental reservoirs, such as cooling tower basins or hot water storage tanks in large or complex water systems, including those found in healthcare facilities such as hospitals and long-term care facilities. While this statement is true with respect to what the CDC finds, storage tanks do not cause Legionnaires' disease any more than an aluminum can causes alcoholism or pencils cause misspelled words.

This is a major error in the CDC toolkit in that it implies tanks cause Legionella growth. Because of this language, many facility engineers have asked for the removal of hot water storage tanks from facilities or facility designs. This creates a whole new set of problems. The removal of storage tanks from facilities that experience significant peak hot water loads often leads to periods where the instantaneous water heater systems that replace the tanks cannot keep up with peak demands for hot water, so the natural tendency of maintenance personnel that are faced with numerous calls of not enough hot water during the peak hours, is to increase system temperatures, which has led to many scald injuries and deaths.

After scald injuries occur, maintenance personnel are usually nervous about scalding issues, so they turn the thermostat down on the instantaneous system to a temperature that promotes Legionella bacteria growth in systems that do not have tanks. Legionella bacteria does not need a tank or reservoir in order to grow. Legionella bacteria will grow anywhere that the conditions are ideal for growth.

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Hot water in storage tanks can be easily maintained at temperatures that will pasteurize the hot water in the storage tanks by maintaining temperatures above 140 F, which will kill Legionella bacteria within 32 minutes, or 150 F, which will kill Legionella bacteria in 2 minutes. Hot water storage tanks in large buildings should circulate the hot water through the storage tank and all parts of the building above 124 F. At temperatures above 122 F Legionella bacteria will not grow and multiply. A master, temperature actuated mixing valve conforming to ASSE 1017 should be installed on all domestic hot water systems in order to accurately control the hot water return temperature. Utilizing mixing valves will assure the return temperature is delivered at a constant hot water distribution temperature so that the hot water return pipe after the circulating pump, and before connecting to the water heater, is at or slightly above 124 F.

Water heater burner thermostats on many water heater models allow temperature fluctuations as much as 15 degrees above and below the thermostat set point, which allows a 30-degree swing in temperature which is not accurate and could promote Legionella bacteria growth in portions of the distribution piping. Therefore, the thermostat dial on a water heater should not be relied upon for accurate temperature control unless the water heater has been certified to the ASSE 1082 water heater temperature control standard. You should also make sure that all plumbing fixtures and points of hot water use have thermostatic or temperature limiting controls adjusted as part of commissioning and routine seasonal maintenance to prevent scalding.

Cooling Tower Basins

Cooling tower basins can be maintained properly by adding water treatment chemicals and flushing or blowing down the cooling tower basins using a conductivity meter to flush water through the basin to lower the conductivity of the water thereby flushing minerals down the drain and lowering the pH levels using a conductivity meter. Water treatment chemical are added based on the make-up water volume to provide proportional chemical control of bacteria in the cooling tower basin. This automated procedure combined with regular monitoring, inspections and scheduled maintenance also minimizes sediment build-up and food sources for bacteria. Constantly monitoring and maintaining condenser water, (cooling tower water) chemicals at levels that will control bacteria growth in the condenser water in the cooling tower basin is how to control bacteria growth.

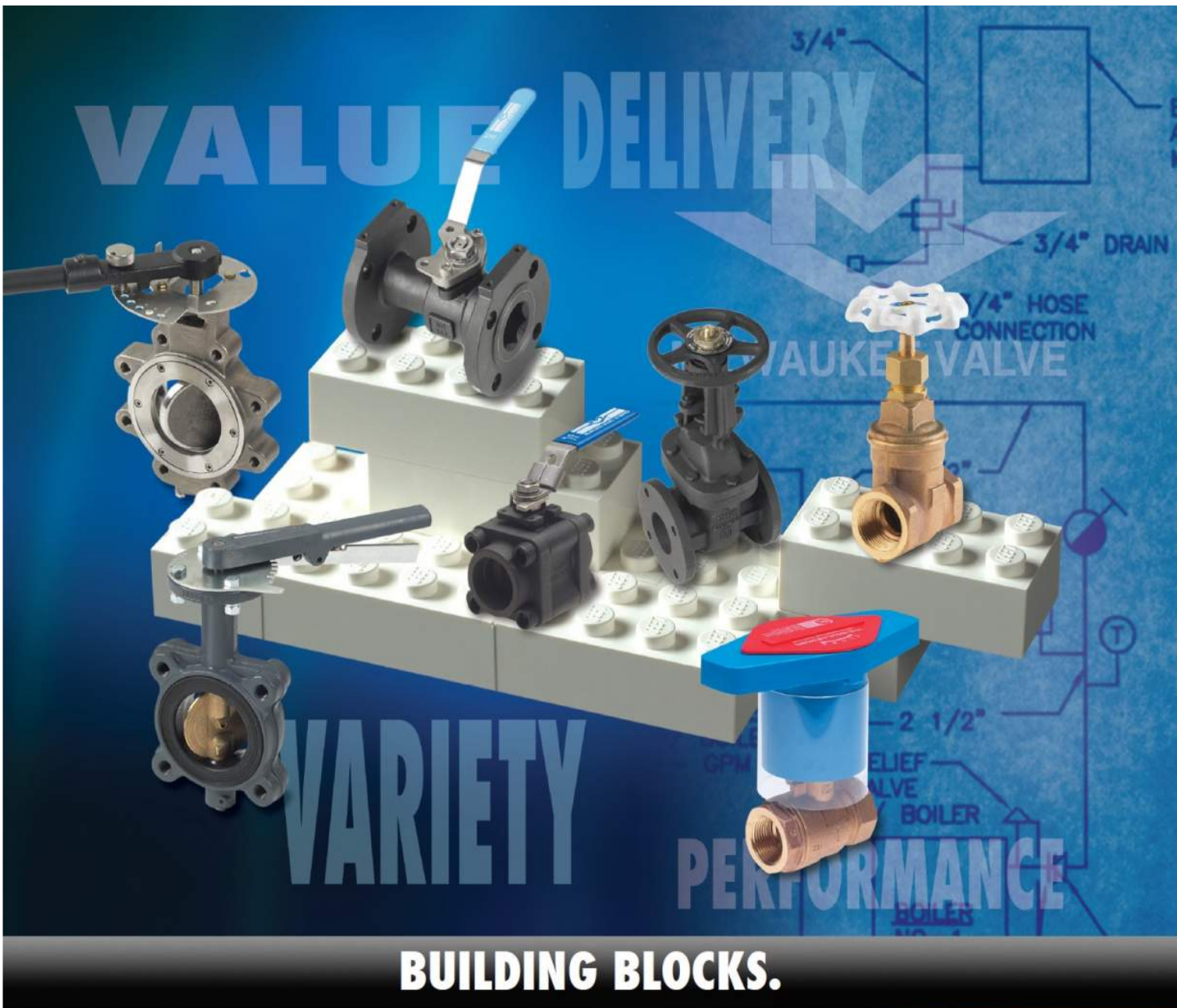
It is very simple to control Legionella bacteria in a system, however, in many cases, I see there are repeated outbreaks because there are people that are responsible for maintenance and risk assessments that do not know what they are looking at and are often guessing at solutions. I have always said there needs to be a certification exam for Legionella Risk Assessors. ASSE has started developing a professional qualifications standard, however there is a big push to focus training requirements on Legionella testing requirements which will not control Legionella growth in building water systems. I'm not saying testing is not important, but the most important thing to teach and test for in a professional qualifications standard is knowledge of how the systems and the components work.

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They have not yet decided to add knowledge of plumbing and mechanical systems to the professional qualifications standard, so I hope the ASSE committee developing the standard includes more requirements to train these people on plumbing and mechanical systems or we will see a lot more five-minute inspections that completely miss the problems in the system while making a sales commission.

Some states and cities are looking at adopting ordinances to require some form of accountability for controlling bacteria growth in building water systems in the wake of several large outbreaks in recent years where many people were sickened and died. Keep maintaining your systems in accordance with a water management plan and perform Legionella testing at intervals scheduled by the water management plan and you will be Legionella free.

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Brian Crisp, CPD
Vice President - Membership

Membership Report

Hello again Folks!

Your Baltimore ASPE leadership has returned from the 2019 ASPE Technical Symposium and it was a phenomenal experience. One of the highlights was the Baltimore Chapter again receiving the Membership Retention Award, which we received at the last symposium in Montreal (2017).

As I'm writing this article, I've just received the updated membership reports from National. We have two new members this month. You know the drill, welcome them into the fold.

James Burke – Kibart
Joseph Loiero – Integrated Design Consultants

We currently sit at 111 members; 5th largest in Region 1 and 18th largest nationwide. Just a reminder, you can renew your membership before the month that it expires. The expiration date is based on when you joined, so don't be afraid to renew early and avoid the stress :)

This month I'd like to again highlight one of the benefits of membership. This month's just happens to be my favorite thing about being a member!

ASPE Read, Learn, & Earns: Every month ASPE publishes a quiz with an accompanying chapter or article from one of the Society's publications. These articles are fantastic, they are great to learn about new topics or brush up on some topics you haven't worked with in a while. I keep copies of them for my own personal plumbing library. These are an easy way to earn CEUs every month and are *free* if you're an ASPE member.

After I've talked about all the major benefits of being a member in these lovely articles, I plan to sprinkle in highlights from recent Read, Learn, & Earns that I think you all would enjoy. So, I hope you all are looking forward to it as much as I am.

If you or anyone you know is interested in joining, or at least hearing about the benefits of membership, please don't hesitate to reach out to me. You can also join directly at <https://www.aspe.org/join>.

AYP Leadership Report

At the 2019 ASPE Technical Symposium, I had the pleasure of attending the AYP Leadership Academy. This was a full-day seminar/workshop that took place just prior to the symposium, available for **ASPE Young Professional (AYP)** members.

The event was very well attended by fellow designers/engineers who are coming into leadership roles or are preparing to do so. Aside from all that we learned, it was a superb networking experience and a great way to introduce yourself to the people you'd be interacting with during the symposium.

To kick off the day, we had a keynote speaker: Tony Wilcox, Vice President, Innovation & Digital Solutions for Zurn Industries, LLC. Tony talked about his professional history as a manager and as a leader. He shared stories and lessons learned from his 20+ years with Harley Davidson and the challenges he's overcome as he has progressed through a large organization.

Prior to attending the academy, everyone who signed up was sent a Leadership Effectiveness Analysis assessment to complete. The day consisted of going over the results of these evaluations, what your personalized results indicated, and how you can work within your strengths to become an effective leader. We were then led by two psychologists who work for a management consulting firm (David Colarossi, Ph.D. & Rob Patterson, Ph.D.) through interactive exercises designed to explore within ourselves our strengths and our areas needing improvement. I'll share with you all two big takeaways:

- Leadership is choosing to make the people around you better.
- Self-insight is knowing why you did, what you did. But Self-awareness is knowing what you're doing in the moment, so you can change.

I found the whole experience very enriching and have a new perspective going forward with my leadership responsibilities.

I would encourage others to seek out these opportunities, whether they are at the society level like at the Symposium/Convention or on a local scale with our AYP events. For more information on our AYP events you can contact Niki (npatel@shermanengineering.com) or you could come talk to me at our chapter meetings.

Thanks, and see you at the meetings!

Brian Crisp, CPD
Vice President, Membership



Hey Young! Professionals!

We want YOU to join our group!

AYP is dedicated to the needs of plumbing designers 35 years old and younger. Your local ASPE Chapter is busy organizing exciting opportunities to help you excel in your career:

- » Partnerships with other industry groups
- » Social and networking events
- » Professional development opportunities
- » Mentoring programs
- » And more!

Visit aspe.org/ayp to get involved.



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2019-2020 ASPE Baltimore Chapter Meeting Schedule

Date: **September 25, 2019**

Speaker: WSSC

Topic: Cross Contamination Control

Date: **October 23, 2019**

Speaker: Generac

Topic: Natural Gas Sizing for Emergency Generators

Date: **November 20, 2019**

Speaker: Viega

Topic: Opportunistic Pathogens 101

Date: **December 13, 2019**

Event: Holiday Party

Location: [Mustang Alley's](#)

Date: **January 22, 2020**

Speaker: McShane PC

Topic: Professional Ethics in Engineering

Date: **February 26, 2020**

Speaker: Professor Kenneth Isman—UMCP

Topic: Importance of Fire Protection Hydraulic Calcs

Date: **March 25, 2020**

Speaker: PVI

Topic: Water Heater Sizing, Construction, and Efficiency

Date: **April 22, 2020**

Speaker: Charlotte Pipe

Topic: Cast Iron Pipe

Date: **April 24, 2020**

Event: Golf Outing

Location: [The Timbers at Troy](#)

Date: **May 27, 2020**

Speaker: Watts

Topic: Automatic Control and Pressure Reducing Valves



Monthly Sponsorship Opportunities

The Baltimore Chapter of ASPE continues to have successful meetings and is looking to continue improving throughout the year.

The Chapter has the following sponsorship opportunities for each month:

Tabletop Presentations: \$100 to provide a tabletop presentation of equipment or material relative to the plumbing profession. The tabletops will be set up from the beginning to the end of the monthly meeting and provides the opportunity to provide a brief (under 5 minutes) presentation.

Please make checks payable to the Baltimore Chapter of ASPE.

Contact Jeff Edwards or Kathy Dwyer if interested

jedwards@muellerassoc.com

kdwyer@ejdwyer.com

